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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/814,498

03/31/2004

Vijayakumar S. RamachandraRao

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07/21/2005

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EXAMINER

LEE, CALVIN

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/814,498

Applicant(s)

RAMACHANDRARAO et al.

Examiner

Lee, Calvin

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 2 May 2005 (Remark).  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 and 15-25 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-3 and 15-25 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 3/31/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_

**FINAL ACTION**

***Response to Amendment***

1. The amendment of claims 1 & 15, the withdraw of claims 4-14, and the addition of claims 19-25, received on May 05, 2005, are acknowledged.

***Claim Rejections - 35 U.S.C. § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 (e) that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language

3. Claims 1-3 and 15-25 are rejected under 35 U.S.C. 102(e) as anticipated by *Ramanathan et al* (US 2004/0262772) or *Ramanathan et al* (US 2005/0003650).

a) *Ramanathan et al* '772 discloses an apparatus comprising:

-a first wafer 201 having a first plurality of copper structures 233 disposed on a first interlayer dielectric layer 232 [Fig. 2F];

-and a second wafer 202 having a second plurality of copper structures 282 disposed on a second interlayer dielectric layer 280 [pages 2-3];

-the second wafer being stacked on the first wafer, with at least some of the first and second plurality of copper structures being substantially aligned and bonded to each other [Fig. 2G].

*Ramanathan et al* suggests the first (or second) substantially uniform heights with each difference between any two of the first substantially uniform heights being 5 nm or less, because *Ramanathan et al* discloses the first (or second) copper structures having the same height.

In re claims 2-3, 16-17, 20-21, and 23-24, *Ramanathan et al* '772 also discloses both the first and second substantially uniform heights are in the range of 10-500nm [¶ 0019].

b) Alternately *Ramanathan et al* '650 discloses an apparatus comprising:

-a first wafer 210 having a first plurality of copper structures 230 disposed on a first interlayer dielectric layer [Figs. 2-6];

-and a second wafer 220 having a second plurality of copper structures 240 disposed on a second interlayer dielectric layer [pages 2-3];

-the second wafer being stacked on the first wafer, with at least some of the first and second plurality of copper structures being substantially aligned and bonded to each other [¶ 0025].

*Ramanathan et al* indirectly suggests the first (or second) substantially uniform heights with each difference between any two of the first substantially uniform heights being 5 nm or less, because *Ramanathan et al* discloses the first (or second) copper structures having the same height.

In re claims 2-3, 16-17, 20-21, and 23-24, *Ramanathan et al* '650 also discloses both the first and second substantially uniform heights (i.e., half of spacing 280) are in the range of 5-100nm [¶ 0028].

c) In re claims 15-18 and 22-25, since *Ramanathan et al* (in both cited arts) discloses "electronic devices having a plurality of stacked semiconductor die/chips /wafers that are electrically interconnected with one another," *Ramanathan et al* inherently teaches or suggests a system comprising:

-a semiconductor package having first and second die with first and second plurality of copper structures respectively disposed on first and second interlayer dielectric layers;

-a bus coupled to the package ("each die may include ... transistors, capacitors, etc")

-and a networking interface component coupled to the bus [¶ 0002 in *Ramanathan et al* '650].

d) In re claims 18 and 25, *Ramanathan et al* also discloses the system being a selected one of a digital versatile disk player and a set-top box [¶ 0002 in *Ramanathan et al* '772].

#### ***Response to Arguments***

4. Applicant's argument that "to establish a prima facie case of anticipation under 35 U.S.C § 102, the Office Action must identify where each and every facet of the claimed invention is disclosed in the '772 reference, or independently in the '650 reference" is persuasive. The Examiner notes that both cited references teach or suggest the scope of the invention -- substantially uniform heights with each difference of any two to be 5nm or less...copper structures being bonded to each other--Being specific, the '772 reference discloses those copper structures 233u having substantially uniform heights with each difference between any two to be virtually 0nm because the structures are planarized with the dielectric layer prior to remove portions of the dielectric layer [Fig. 2B]. So have the structures 283u substantially uniform heights with each difference between any two pillars. Eventually both sets of the structures are bonded to each other.

The spacing **290** in the reference '650 is the lateral space between two adjacent structures [Fig. 2], not the structure height difference being discussed. One more time, the structures **230**, **240** of *Ramanathan* have substantially the same heights with each difference between any two [please refer to all figures in the cited reference].

Note in the above rejections, the specific portions of *Ramanathan et al* '772 and *Ramanathan et al* '650 have been pointed out.

5. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire three months from the mailing date of this action. In the event a first reply is filed within two months of the mailing date of this final action and the advisory action is not mailed until after the end of the three-month shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than six months from the date of this final action.

#### *Contact Information*

6. Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at (571) 272-1896 on Mondays thru Thursdays 6:30-4:30PM. If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2818's Supervisory Patent Examiner *David Nelms* can be reached at (571) 272-1787. The fax phone number for the organization (where this application is assigned to) is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system at <http://pair-direct.uspto.gov>. Should you have questions on access to the PAIR system, contact the Electronic Business Center at (866) 217-9197.



Date: July 19, 2005



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